2.5 L6-Special Lines in Triangles

Median: A line that joins the vertex of a triangle to the midpoint of the opposite side.

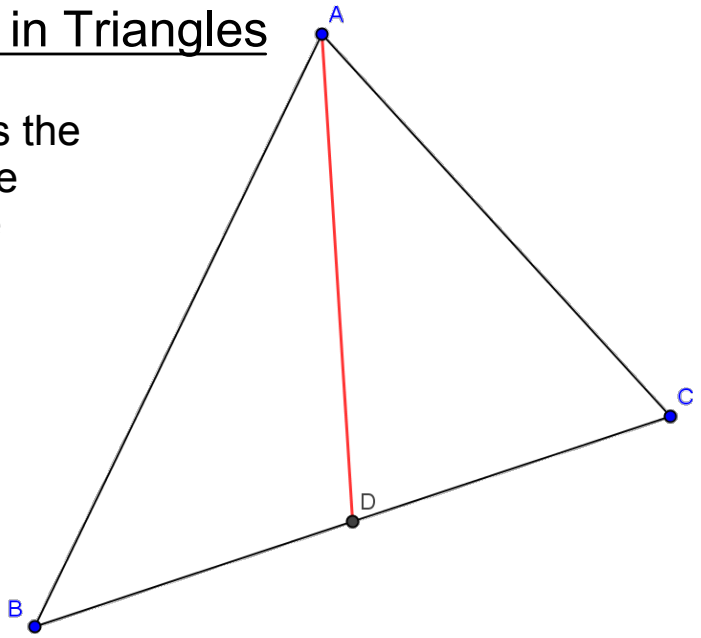
1) Midpoint = M_{BC}

2) $m_{AD} = \frac{y_D - y_A}{x_D - x_A}$

3) Sub A or D into

$y = m_{AD}x + b$

to solve b



Altitude: A line from a vertex to the opposite side that is perpendicular to the opposite side.

1) find slope m_{BC}

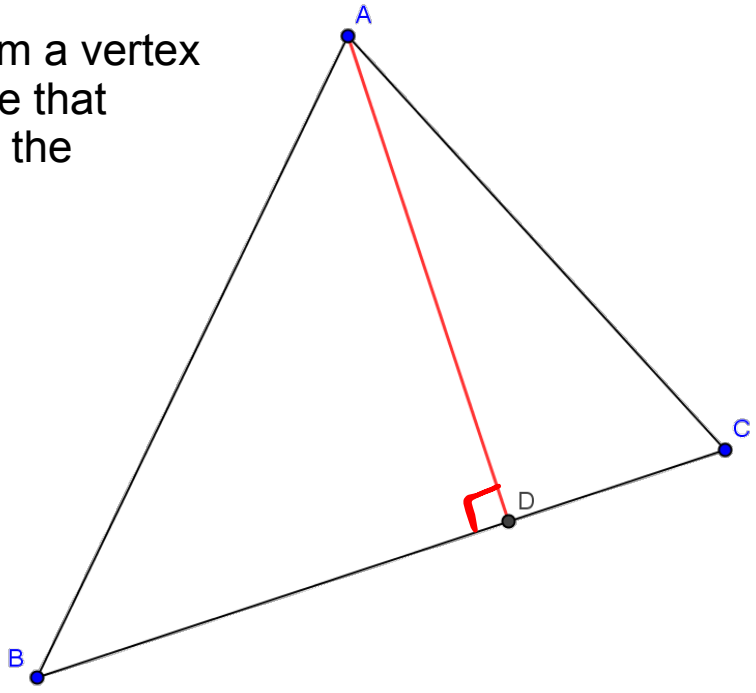
2) state $m_{AD} = -\frac{1}{m_{BC}}$

3) $y = m_{AD}x + b$

4) sub point A into

$y = m_{AD}x + b$

to solve b



Perpendicular Bisector:

A perpendicular line passing through the midpoint of a line segment.

1) Midpoint = M_{BC}

2) find slope m_{BC}

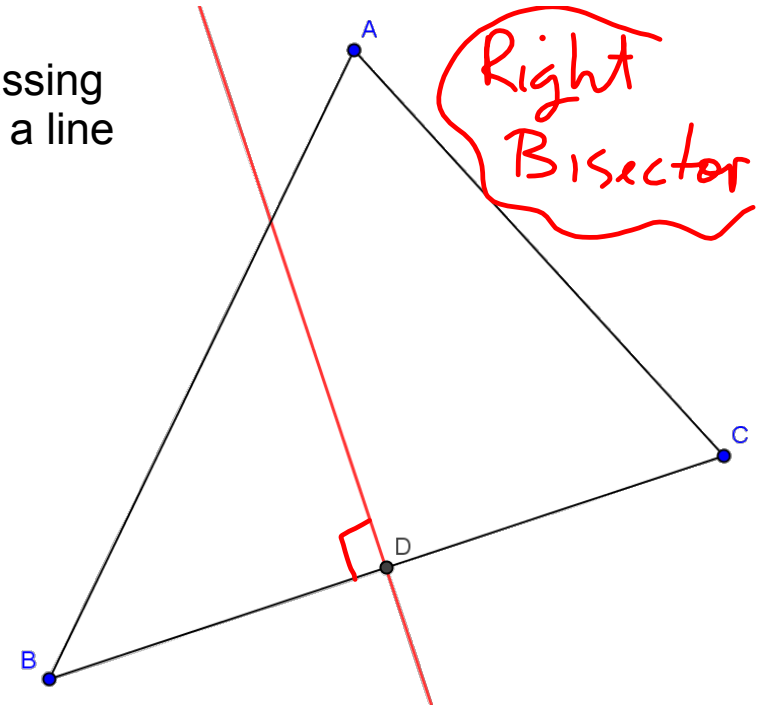
3) state $m_{\perp} = -\frac{1}{m_{BC}}$

4) $y = m_{\perp} x + b$

5) Sub D into

$y = m_{\perp} x + b$

to solve b

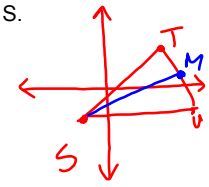


L6-Special Lines in Triangles

Important: make a sketch so you don't get confused

Ex. 1 Triangle STU has vertices at S(-2,-3), T(9,4) and U(11, -4).

a. Find the equation of the median from S.



① $M = \left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$

$= \left(\frac{11+9}{2}, \frac{-4+4}{2}\right)$

$= (10, 0)$

② $m_{SM} = \frac{y_2-y_1}{x_2-x_1}$

$= \frac{0-(-3)}{10-(-2)}$

$= \frac{3}{12}$

$= \frac{1}{4}$

③ $y = \frac{1}{4}x + b$

Sub (10,0) to solve b

$y = \frac{1}{4}x + b$

$0 = \frac{1}{4}(10) + b$

$0 = \frac{10}{4} + b$

$b = -\frac{10}{4}$

$b = -\frac{5}{2}$

∴ the equation of the median is $y = \frac{1}{4}x - \frac{5}{2}$

Ex.1 continues...

Triangle STU has vertices at S(-2,-3), T(9,4) and U(11, -4).

b. Find the equation of the altitude from U.

$m_{ST} = \frac{y_2 - y_1}{x_2 - x_1}$

$= \frac{7}{11}$

$m_{\perp} = -\frac{11}{7}$

$y = -\frac{11}{7}x + b$

Sub u to solve b

$-4 = -\frac{11}{7}(11) + b$

$-4 = -\frac{121}{7} + b$

$-4 + \frac{121}{7} = b$

$-\frac{28}{7} + \frac{121}{7} = b$

$+\frac{93}{7} = b$

∴ the equation of the altitude is $y = -\frac{11}{7}x + \frac{93}{7}$

Ex.1 continues...
Triangle STU has vertices at S(-2,-3), T(9,4) and U(11, -4).

c. Find the equation of the perpendicular bisector of side TU.

$M_{TU} = (10, 0)$

$m_{TU} = \frac{y_2 - y_1}{x_2 - x_1}$

$= -4$

$m_{\perp} = \frac{1}{4}$

$y = \frac{1}{4}x + b$

Sub (10,0) to solve b

$0 = \frac{1}{4}(10) + b$

$0 = \frac{10}{4} + b$

$-\frac{5}{2} = b$ Reduce

$b = -\frac{5}{2}$

∴ the equation of the right bisector is $y = \frac{1}{4}x - \frac{5}{2}$

Assigned Work:

Triangle ABC has vertices A(3, 4), B(-5, 2) and C(1, -4). Find the equation for the altitude from A to BC.

p.79 #12
p.80 #13a
p.102 #4
p.110 #13